

Analysis of the Effectiveness of Targeted Nursing in Children with Severe Viral Encephalitis Complicated with Respiratory Failure

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Abstract: *Objective:* To explore and analyze the effectiveness of targeted nursing in children with severe viral encephalitis complicated with respiratory failure. *Methods:* From April 2021 to April 2023, 74 children with severe viral encephalitis complicated with respiratory failure admitted to the Department of Pediatrics of our hospital were selected as the research objects and divided into the target group (n = 37) and the reference group (n = 37). Targeted nursing was given to the target group, while general nursing was given to the reference group. Physical rehabilitation, motor scores, and lung function were compared between the groups. *Results:* The recovery time of limb abnormalities, convulsions, abnormal consciousness, and cranial nerve disorders in the target group was significantly better than that in the reference group ($P < 0.05$). The motor function, joint activity and pain, sensory function, and total score of the target group were significantly lower than those of the reference group ($P < 0.05$). After the intervention, lung function indicators including VC (vital capacity), FVC (forced vital capacity), and MVV (maximum voluntary ventilation) of the target group were better than those of the reference group ($P < 0.05$). *Conclusion:* Targeted nursing can shorten the recovery period of severe viral encephalitis complicated with respiratory failure in children, speed up the recovery of motor function, and improve lung function. This nursing model has a significant application effect in children with severe viral encephalitis complicated with respiratory failure.

Keywords: Targeted nursing; Severe viral encephalitis in children; Respiratory failure

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1. Introduction

Viral encephalitis is a common disease in children. It is an intracranial inflammatory lesion caused by the combined action of multiple viruses, leading to brain tissue damage^[1]. This severe disease has an acute onset, with a high rate of disability, mortality, and recurrence. The course of the disease ranges from a few days to 1–2 months^[2]. Primary viral encephalitis has an incubation period of about six days. In the prodromal stage, there is apparent fever, accompanied by cough, nausea, and myalgia. The first symptom of the disease is abnormal mental behavior and personality. Significant changes will occur subsequently, such as status epilepticus in

severe cases^[3]. Poor control of viral encephalitis can damage the respiratory system leading to respiratory failure, increasing disease severity and treatment difficulty^[4]. Targeted nursing for children with viral encephalitis complicated with respiratory failure can provide corresponding care based on the child's condition, which has a positive effect on the control and treatment of the disease^[5]. This article aims to study and analyze the effectiveness of targeted nursing in children with severe viral encephalitis complicated with respiratory failure.

2. General information and methods

1.1. General information

From April 2021 to April 2023, 74 children with severe viral encephalitis complicated with respiratory failure admitted to the pediatric department of our hospital were selected as research subjects and divided into the target group ($n = 37$) and the reference group ($n = 37$) using a random number lottery method. There were 18 males and 19 females in the target group; the age range was 3–9 years old, with an average age of 6.28 ± 1.24 . There were 17 males and 20 females in the reference group; they were 4–9 years old, with an average age of 6.15 ± 1.15 . When comparing general information such as gender and age between the groups, there was no statistically significant difference ($P > 0.05$).

Inclusion criteria included children who meet the diagnosis of severe viral encephalitis complicated with respiratory failure; patients with informed consent; and patients with complete clinical case information.

Exclusion criteria were patients with mental illness; patients with congenital diseases or developmental defects; patients with organ failure; and patients with abnormal coagulation function.

1.2. Methods

The reference group received general nursing, including providing medication, treatment, and other measures and monitoring the development of the disease.

Targeted nursing was implemented for the target group:

- (1) Environmental adjustment: The temperature of the ward was conformed to the physiological conditions of the children, maintaining appropriate humidity. Additionally, the windows were opened regularly to ensure proper ventilation.
- (2) Body temperature management: The body temperature of the children was monitored to ensure no fluctuation occurred. For children with high fever, their body temperature was measured every 60 minutes. The temperature measurement period was adjusted to 120 minutes when the body temperature returned to normal. According to the children's body temperature, corresponding cooling measures were taken to lower the body temperature, such as physical cooling, drug cooling, etc. Appropriate measures were taken to prevent the children from catching a cold.
- (3) Intervention for convulsions and seizures: For children who have convulsions and seizures, they were laid down on the bed with their clothes taken off, and diazepam was injected as directed by the doctor. Their heads were turned to one side, and gauze was used to clean the secretions. After the attack, midazolam was administered as directed by the doctor.
- (4) Respiratory tract intervention: The children's respiratory status was assessed by turning them over and patting them on the back when lying on the side to promote the discharge of respiratory secretions. Oxygen was given to maintain an adequate oxygen supply.
- (5) Dietary intervention: The children were encouraged to eat more fruits and green leafy vegetables, supplement protein, and more easily digestible foods.

(6) Rehabilitation exercise: The children’s vital signs and recovery status were evaluated. They were taught to perform physical activities to increase the limb movement and activity. Encouragement was provided during the activities, with full affirmation given to enhance their confidence. Children with a more stable condition were encouraged to carry out independent activities. Communication and interaction were enhanced for children with language barriers, such as storytelling and music listening to improve their language expression skills.

1.3. Observation indicators

- (1) The physical rehabilitation of the two groups was compared, including the time taken to recover from limb abnormalities, convulsions, consciousness abnormalities, and cranial nerve disorders.
- (2) The motor scores of the two groups were compared and evaluated using the Fugl-Meyer score, including motor function, joint activity and pain, and sensory function.
- (3) The lung function of the two groups was compared, including VC (vital capacity), FVC (*forced vital capacity*), and MVV (*maximum voluntary ventilation*).

1.4. Statistical analysis

SPSS21.0 statistical software was selected to process and analyze the data; the count data were expressed by the number of cases (n) and percentage (%), the χ^2 test was implemented; the measurement data were expressed by mean \pm standard deviation (SD), and the *t*-test was implemented, $P < 0.05$ was considered as a statistically significant difference.

3. Results

3.1. Comparing the physical rehabilitation of the target group and the reference group

The recovery time of limb abnormalities, convulsions, abnormal consciousness, cranial nerve disorders, and other physical recovery conditions of the target group was significantly better than those of the reference group ($P < 0.05$). The results are shown in **Table 1**.

Table 1. The comparison of physical rehabilitation between the groups (mean \pm SD, days)

Group	Number of cases	Recovery time of limb abnormalities	Recovery time of convulsions	Recovery time of abnormal consciousness	Recovery time of cranial nerve disorders
Target group	37	10.57 \pm 2.51	1.52 \pm 1.58	1.89 \pm 1.56	8.27 \pm 3.15
Reference group	37	14.24 \pm 3.57	3.55 \pm 1.48	3.67 \pm 1.58	12.54 \pm 3.55
<i>t</i> value	-	5.1153	5.7037	4.8763	5.4726
<i>P</i> value	-	0.0000	0.0000	0.0000	0.0000

3.2. Comparing the motor scores of the target group and the reference group

As presented in **Table 2**, the motor function, joint activity and pain, sensory function, and total score of the target group were significantly lower than those of the reference group ($P < 0.05$).

Table 2. Comparison of motor scores between the groups (mean \pm SD, points)

Group	Number of cases	Motor function	Joint activity and pain	Sensory function	Total score
Target group	37	41.25 \pm 2.58	23.14 \pm 1.75	11.28 \pm 2.05	75.67 \pm 6.38
Reference group	37	78.24 \pm 3.55	46.21 \pm 3.52	15.27 \pm 3.59	139.72 \pm 10.66
<i>t</i> value	-	51.2707	35.6979	5.8707	31.3603
<i>P</i> value	-	0.0000	0.0000	0.0000	0.0000

3.3. Comparing the lung function of the target group and the reference group

Before the intervention, the difference of the lung function indicators such as VC, FVC, and MVV between the groups was not statistically significant ($P > 0.05$). After the intervention, the VC, FVC, and MVV of the target group were significantly better than those of the reference group ($P < 0.05$), as shown in **Table 3**.

Table 3. Comparison of lung function between the groups (mean \pm SD)

Group	Number of cases	VC (L)		FVC (L)		MVV (L/min)	
		Before intervention	After intervention	Before intervention	After intervention	Before intervention	After intervention
Target group	37	2.75 \pm 0.52	1.49 \pm 0.23	2.68 \pm 0.52	1.58 \pm 0.42	65.84 \pm 4.55	50.27 \pm 3.22
Reference group	37	2.71 \pm 0.62	1.28 \pm 0.56	2.69 \pm 0.57	2.19 \pm 0.39	65.76 \pm 4.63	60.27 \pm 3.51
<i>t</i> value	-	0.3006	2.1100	0.0788	6.4738	0.0749	12.7702
<i>P</i> value	-	0.7645	0.0383	0.9374	0.0000	0.9405	0.0000

4. Discussion

Viral encephalitis in children occurs when the intracranial blood-brain barrier is damaged and cannot resist viral invasion. Viral invasion in the brain causes an inflammatory reaction in the meninges and brain parenchyma, resulting in lesions [6]. The condition progresses rapidly in critically ill children, with persisting high fever and accompanying coma. As the disease progresses, it can lead to organ failure, the most common of which is respiratory failure. Since children's body systems are in the developmental stage, there is a high chance of sequelae or even death after treatment [7]. The primary treatment option of viral encephalitis in children is antiviral therapy, followed by lowering the body temperature [8]. Receiving symptomatic therapy early increases the chance of being cured. Viral encephalitis complicated with respiratory failure in children is a severe disease with treatment difficult and poor prognosis [9]. In order to improve the prognosis of children with this disease, targeted nursing is provided during the treatment. Based on the child's condition, targeted nursing involves formulating an individual care plan, implementing nursing measures for the child's recovery, exerting beneficial nursing effects, and promoting the child's recovery [10,11]. Targeted nursing implemented includes ensuring optimal ward environment, monitoring body temperature changes, and taking intervention measures to lower body temperature [12]. Symptomatic treatment is provided to children with convulsions and seizures, and cooperation with doctors in first aid measures is carried out. The condition of the child's respiratory tract is monitored, respiratory secretions are cleared promptly, and oxygen is given to improve the symptoms of dyspnea [13]. When the children are physically recovered, they are allowed to perform rehabilitation exercises to promote the recovery of physical functions, improve mental state, and reduce the occurrence of sequelae [14,15].

The results of this study showed that the physical rehabilitation of the target group, such as the recovery time of limb abnormalities, convulsions, abnormal consciousness, and cranial nerve disorders, were all

significantly better than those of the reference group ($P < 0.05$). The motor function, joint activity and pain, sensory function, and total score of the target group were significantly lower than those of the reference group ($P < 0.05$). Before the intervention, the lung function indicators such as VC, FVC, and MVV showed no statistically significant difference ($P > 0.05$); after the intervention, the VC, FVC, and MVV of the target group were significantly better than those of the reference group ($P > 0.05$). After targeted nursing, the children recovered in a shorter time, their motor functions and lung functions improved significantly. This nursing model promotes the children's recovery and has specific nursing significance for treating and rehabilitating viral encephalitis with respiratory failure.

5. Conclusion

In summary, it is necessary to implement targeted nursing interventions for children with severe viral encephalitis and respiratory failure. Various rehabilitation indicators have been significantly improved, indicating that the targeted nursing is worthy of widespread application.

Disclosure statement

The author declares no conflict of interest.

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